

# INVESTIGATOR'S ANNUAL REPORT

## National Park Service

All or some of the information provided may be available to the public

<b>Reporting Year:</b> 1999	<b>Park:</b> Shenandoah NP									
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<table border="0"> <tr> <td><b>Name:</b> Bob Ross</td> <td><b>Phone:</b> 717-724-3322 x. 239</td> <td><b>Email:</b> n/a</td> </tr> <tr> <td><b>Name:</b> Joe Clark</td> <td><b>Phone:</b> 423-974-0739</td> <td><b>Email:</b> n/a</td> </tr> <tr> <td><b>Name:</b> Dave Morton</td> <td><b>Phone:</b> 304-724-4477</td> <td><b>Email:</b> n/a</td> </tr> </table>		<b>Name:</b> Bob Ross	<b>Phone:</b> 717-724-3322 x. 239	<b>Email:</b> n/a	<b>Name:</b> Joe Clark	<b>Phone:</b> 423-974-0739	<b>Email:</b> n/a	<b>Name:</b> Dave Morton	<b>Phone:</b> 304-724-4477	<b>Email:</b> n/a
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<b>Permit#:</b> SHEN1999N-242										
<b>Park-assigned Study Id. #:</b> unknown										
<b>Project Title:</b> Modeling Stand Vulnerability And Biological Impacts Of The Hemlock Woolly Adelgid										
<b>Permit Start Date:</b> Jan 01, 1999	<b>Permit Expiration Date</b> Jan 01, 2000									
<b>Study Start Date:</b> Jan 01, 1998	<b>Study End Date</b> Jan 01, 2002									
<b>Study Status:</b> Completed										
<b>Activity Type:</b> Research										
<b>Subject/Discipline:</b> Other										
<b>Objectives:</b> <p>In the last two decades, substantial declines in eastern hemlock (<i>Tsuga canadensis</i>) have been observed throughout its range, resulting in widespread concern. Hemlock defoliation has largely been attributed to the hemlock woolly adelgid (<i>Adelges tsugae</i>: HWA), an exotic aphid-like insect that is native to Japan. Many hemlock stands in SHEN have been devasated by HWA, and hemlock stands are threatened at DEWA and GSMNP. The impact from HWA on the ecology of Appalachian forests is poorly understood, but has the potential for significant disturbance to biotic communities by changing energy inputs, micro-climatic environments, and physical habitat structure. The goal of phase 1 of this research will be to construct an empirical model of hemlock stand vulnerability at site, landscape, and regional scales for SHEN. In phase 2, our goal is to develop spatially predictive models of short- and long-term biotic changes likely to occur due to loss of eastern hemlock forests in SHEN, DEWA, and GSMNP.</p>										
<b>Findings and Status:</b> <p>In an effort to address possible landscape correlates to hemlock decline in SHEN, we conducted a preliminary analysis of 6 years (1993-1998) of hemlock health estimates in comparison terrain characteristics and potential dispersal corridors at the stand level. We found that elevation, terrain shape, and distance to streams all exhibited relatively strong correlation with hemlock decline, although the relationship varied by year. There appears to be preliminary evidence suggesting that environmental conditions are either controlling HWA or making hemlock stands more susceptible to decline. We are using the results of this preliminary analysis to guide more detailed efforts aimed at modeling hemlock stand vulnerability as a result of site, landscape, and regional factors. Preliminary findings are available on the internet at <a href="http://ael.er.usgs.gov/groups/gis/hemlock/shenrept.pdf">http://ael.er.usgs.gov/groups/gis/hemlock/shenrept.pdf</a></p>										
<b>For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?</b> No										
<b>Funding provided this reporting year by NPS:</b>	<b>Funding provided this reporting year by other sources:</b>									

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<b>Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college</b>	
<b>Full name of college or university:</b>  n/a	<b>Annual funding provided by NPS to university or college this reporting year:</b>  0